



# **17871 – OASD(EI&E) Environment, Safety, and Occupational Health (ESOH) in Acquisition Overview**

**2015 NDIA Systems Engineering Conference**

**Wednesday, October 28, 2015**

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Office of the Assistant Secretary of Defense  
(Energy, Installations & Environment)**



# Outline

## Acquisition Environment, Safety, and Occupational Health (ESOH)

### ➤ Mission and Objectives

- Support the War Fighter and Address ESOH

### ➤ Policy and Guidance

- Overview of Major Policy

### ➤ Implementation & Initiatives

- Program Oversight
- Sustainability
- Life Cycle Analysis in Acquisition
- Hazardous Materials Management
- HFC Minimization
- Environmental Liabilities
- Climate Change
- REACH





# Acquisition ESOH Mission





# Acquisition ESOH Objectives

## Have DoD Acquisition Programs Address:

### ➤ Environment

- Manage ESOH risks and minimize hazards to environment using MIL-STD-882E methodology
- Compliance with all ESOH regulations (e.g., Clean Air Act)
- Compliance with National Environmental Policy Act (NEPA) / Executive Order (EO) 12114, Environmental Effects Abroad of Major Federal Actions

### ➤ Safety and Occupational Health

- Use MIL-STD-882E, Standard Practice System Safety for all developmental and sustaining engineering activities
  - Apply methodology as early as possible during system design
- Manage ESOH risks and minimize hazards to people and equipment
  - **Includes managing software system safety risks**
    - **This includes software that influences a person's decision making**

Presentation #17803 today at 3:15 PM covers software system safety



# Acquisition ESOH Objectives

## HAZARDOUS MATERIALS (HAZMAT) EXAMPLE

### ➤ Minimize hazards – best way is to minimize use

- For example, minimize risks from hazardous materials (i.e., ozone depleting substances, materials with high Global Warming Potential (GWP))
- Purchase Green products where possible
- Use approved alternatives when possible

### ➤ Know what hazardous materials are in the system

- Needed if chemical is banned due to changing regulatory landscape
- Needed in global market to support Foreign Military Sales (FMS)
- Needed to ascertain potential environmental liabilities (costs)

HAZMAT has Environment considerations  
HAZMAT has Safety considerations  
HAZMAT has Occupational Health considerations  
DOD working to address ESOH considerations holistically!!!



# Acquisition ESOH Policy and Guidance





# Acquisition ESOH Policy

## ➤ DoD Instruction 5000.02, *Operation of the Defense Acquisition System*, issued January 7, 2015

- References MIL-STD-882E, Standard Practice System Safety
- Clarifies ESOH Risk Acceptance for Joint Programs
- Better addresses ESOH for early Testing and Development Activities
- Minimizes duplication of information in acquisition documents
  - Program managers (PM) will document the ESOH planning in the Systems Engineering Plan (SEP)
    - Example: SEP to list the Integrated Product Team(s) responsible for ESOH
  - PM will document results of results of their planning and implementation in the Programmatic ESOH Evaluation (PESHE)
    - Hazards (and associated ESOH risk) data
    - ESOH risk management information
    - Hazardous materials management data, including minimization efforts
  - PM will develop a NEPA / EO 12114 Compliance Schedule



OK to combine PESHE & NEPA/EO 12114 Compliance Schedule in single document



# Acquisition ESOH Guidance

## ► Defense Acquisition Guidebook, Chapter 4:

- Section 4.3.18.9, Environment, Safety, and Occupational Health
  - Elaborates on ESOH content for the SEP, PESHE, and NEPA/EO 12114 Compliance Schedule
  - Includes Sustainable Procurement guidance
- Section 4.3.19.2, Sustainability Analysis
  - Includes Streamlined Life Cycle Assessment as a Systems Engineering process tool
- Section 4.3.18,16, Operational Energy
- Section 4.3.18,7, Demilitarization & Disposal

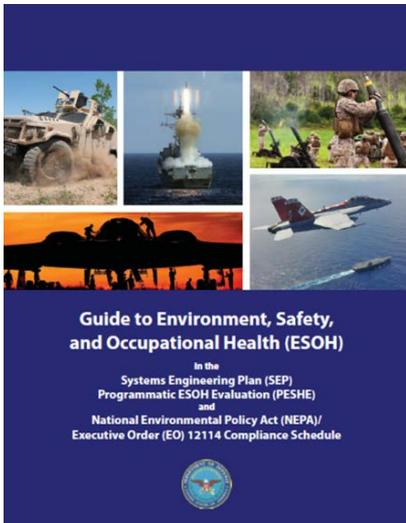




# Additional Resources

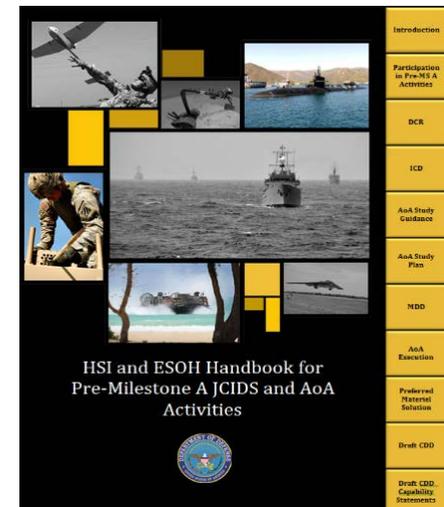
- Acquisition Community Connection (ACC)  
ESOH Community of Practice (CoP)

ACC Website:  
<https://acc.dau.mil/esoh>



- Guide to ESOH in the Systems Engineering Plan (SEP), Programmatic ESOH Evaluation (PESHE), and NEPA/EO 12114 Compliance Schedule

- Human Systems Integration (HSI) & ESOH Handbook for pre-Milestone A Joint Capabilities Integration and Development System (JCIDS) and Analysis of Alternatives (AoA) Activities





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# Acquisition ESOH Implementation & Initiatives





# Acquisition ESOH Program Oversight – Overview

**Evaluates implementation of Acquisition ESOH policy and guidance and determines if objectives are being met**

## ➤ Issues and Impacts

- Programs request tailoring to waiver requirement to produce PESHE due to lack of understanding (e.g., need to evaluate software system safety)
  - » *Impact:* Programmatic risks from lack of ESOH analyses (e.g., software produces unintended consequences)
- Proposal to use Halon 1301, ozone depleting substance (ODS), for fire suppression
  - » *Impact:* Future supply risks for meeting mission requirements (legacy systems and future systems requiring Halon 1301)
- Failure to minimize hexavalent chromium
  - » *Impact:* Potential exposure risks to maintainers, increased end-of-life costs to Demilitarization/Disposal.
- Lack of timely National Environmental Policy Act (NEPA) / EO 12114 analyses
  - » *Impact:* Schedule Risks to programs

**OASD(EI&E) Working to Minimize Impacts**



# Acquisition ESOH Program Oversight – Program Support Assessments (PSAs)

- **Office of Deputy Assistant Secretary of Defense for Systems Engineering (ODASD(SE)) leads PSAs**
  - DoDI 5000.02 mandates Defense Acquisition Board decision support
  - Provides a Systems Engineering Focused Review
- **OASD(EI&E) provides ESOH Subject Matter Experts to:**
  - Validate program compliance
  - Assess effectiveness of Acquisition ESOH policy
- **OASD(EI&E) supported five PSAs in Fiscal Year (FY) 2015 and will continue PSA support in FY 2016**
  - Joint Air Ground Missile (JAGM)
  - Next Generation Jammer (NGJ)
  - Consolidated Afloat Networks and Enterprise Services (CANES)
  - F-22 Increment 3.2B (*in process*)
  - DDG 51 Flight III Ships (*in process*)





# Sustainability

## ➤ Addressing Sustainability...

✓ **Ensures Long Lasting Performance**

✓ **Lowers Risks**

### ➤ Improves operational performance

- *by sustaining land, air, and water resources*

### ➤ Improves availability of mission-oriented *products*

### ➤ Reduces energy dependence...

- *on supply lines*
  - ✓ electrical grid, gas pipelines, truck convoys in theater
- *on foreign oil*

### ➤ Reduces exposure to health hazards

- *Of our personnel, their families, & adjacent communities*

### ➤ Reduces costs – life cycle & compliance

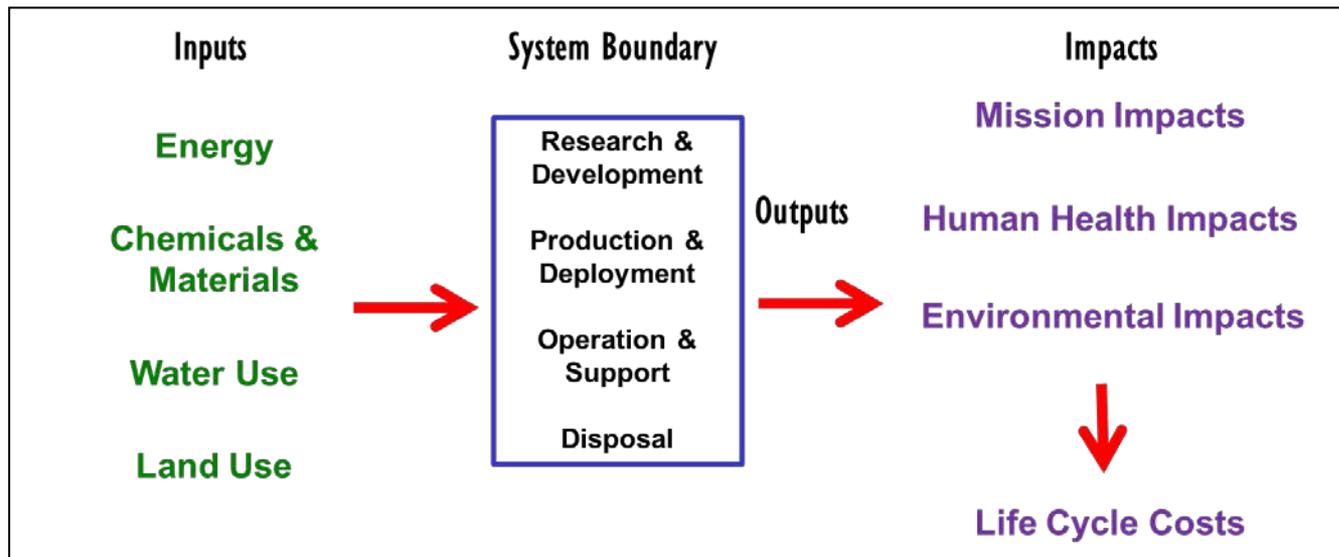
- *Minimizes **impacts** and **total ownership costs** of systems, materiel, facilities, and operations*





# Life Cycle Sustainability Analysis

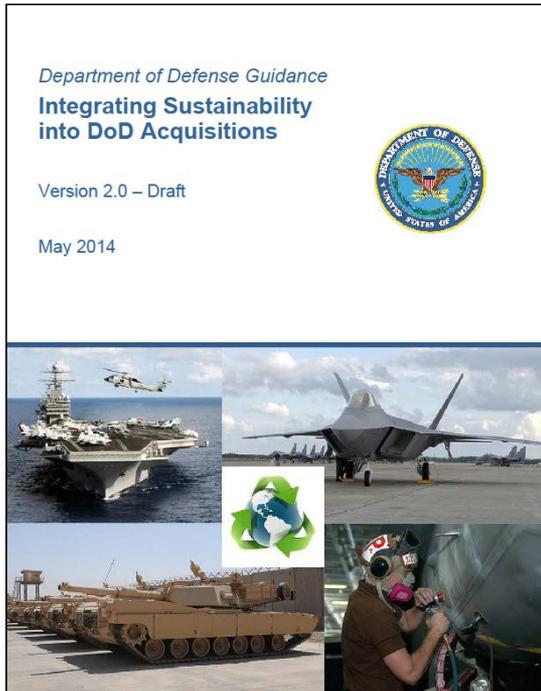
- **Develop a sustainability analysis Program Offices can use to help understand life cycle impacts during the design process and influence decision making**
  - Human health and environmental impacts
  - Life cycle costs of impacts
- **Approach: Develop a Sustainability Analysis Using Life Cycle Assessment Methods**
  - Tailored analysis for DoD – ***Streamlined Life Cycle Analysis (SLCA)***





# What is a Sustainability Analysis?

## Sustainability Analysis = SLCA + LCCs



**Streamlined Life Cycle Assessment (SLCA)**

**Gives Relative Impacts**

**Must be “Doable”**

**Life Cycle Costs (LCC)**

**Must be compatible with  
the DoD cost structure**

***Used to Compare Alternatives!***



# Sustainability Analysis Pilot Project

## ➤ Phase I: Collaboration with Boeing & Sikorsky

- Calculated impacts & life cycle costs of two design alternatives for two current acquisitions manufactured and sustained over 30 years:

117 Boeing P-8A



&



573 Sikorsky MH-60R

- Example life cycle costs addressed include personal protective equipment, hazardous waste management and disposal, emissions/discharge permits

## ➤ Phase II: SLCA & Life Cycle Costing Case Studies

- **3M** – Analyzed traditional vs. LED lighting aboard Navy ships
- **GE Aviation** - Analyzed traditional vs. additive manufacturing process for key parts in jet engines
- **Lockheed Martin** - Analyzed alternative mixes of renewable energy & micro-grids at Fort Bliss, TX

Sustainability Analysis forces thinking about life cycle activities of the system in an organized, consistent method in an Innovative and Simple but credible approach



# Hazardous Materials (HAZMAT) Management

- **Promote Hazardous Materials Minimization**
- **Current Challenges:**
  - Multiple management approaches
  - Multiple hazardous material lists
  - DoD's priorities were not clear to industry
- **Approach: Align National Aerospace Standard (NAS) 411 (Hazardous Materials Management Program Standard Practice) & MIL-STD-882E Task 108 (Hazardous Materials Management Plan)**
  - MIL-STD-882E, Task 108, Hazardous Materials Management Plan
    - Can be placed on contract by Acquisition Programs
    - Prioritizes efforts to eliminate or reduce hazardous material usage by categorizing targeted materials as Prohibited, Restricted, and Tracked
    - HAZMAT to be managed by category
  - NAS 411 provides:
    - Detailed guidance for implementing MIL-STD-882E, Task 108
    - Lists of baseline hazardous materials in the three categories





# Hazardous Materials Management, Cont.

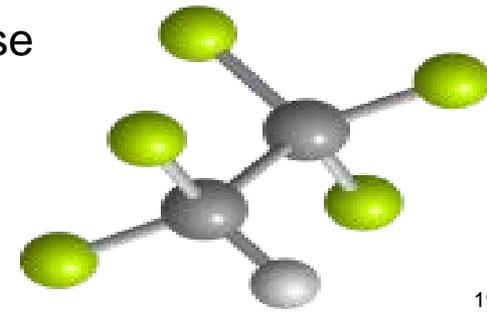
- **Phase 1: Updated National Aerospace Standard (NAS) 411, Hazardous Materials Management Program (HMMP), and developed complementary NAS 411-1, Hazardous Materials Target List (HMTL)**
  - NAS 411 provides detailed guidance for MIL-STD-882E Task 108
  - NAS 411-1 lists baseline hazardous materials in the three categories (Prohibited, Restricted, and Tracked)
- **Phase 2: Update NAS 411 to add a baseline “Tracked” list to NAS 411-1**
  - Only including materials with Chemical Abstract Society (CAS) numbers
  - Working with Industry to include NAS 411-1 in the International Aerospace and Defense Declarable Substances List (AD-DSL)
  - Industry currently reviewing proposed “Tracked” List
- **Phase 3: Update NAS 411 to add risk assessment guidance for hazardous materials**
  - Next step for DoD and Industry

More on NAS 411 efforts in Presentation #18065 today at 9:10AM and Presentation #17867 tomorrow at 8:35AM



# Hydrofluorocarbons (HFCs) Minimization

- **Promote alternatives to replace HFC's that contribute significantly to Global Warming**
- **HFCs are used in virtually all existing and new weapons systems**
  - Replacements for Ozone Depleting Substances (ODSs)
    - Chlorofluorocarbons (CFCs), Hydro-Chlorofluorocarbons (HCFCs), & Halons
  - Environmental control systems, insulating foams, aerosol propellants and solvents for weapons system maintenance
- **Alternatives are needed for HFCs:**
  - Contribute to Climate Change
    - Global Warming Potential (GWP) Thousands of Times More Potent Than CO<sub>2</sub>
    - Already Regulated by UN Framework Convention on Climate Change & U.S. Clean Air Act (USCAA)
    - DoD Emissions Reported to CEQ and OMB in the Annual Energy Management Report/Greenhouse Gas Inventory per EO 13693
  - Emerging Proposals to Phase-Down Production and/or Ban Use
    - EU Fluorinated-Gas Regulation
    - Montreal Protocol Amendment Proposals
    - U.S. Climate Action Plan





# HFC Minimization, Cont.

## ➤ **Minimization Effort Strives to Protect DoD Equities**

- Clean Air Act Services Steering Committee, Ozone Depleting Substances Subcommittee Interagency Coordination
  - Meet regularly with Environmental Protection Agency and the Department of State
  - Review & Comment on Proposed Rules and US Government Positions
- Ensure a Phase-Down not a Phase-Out
  - Critical Uses With No Suitable Alternatives
  - Lessons-Learned from Managing Montreal Protocol ODS Essential / Critical Use Exemptions
  - Seek Military Exemptions Should Phase-Down Plateau Drop Too Low
- External Engagement
  - Other Militaries
  - Industry
  - Other Fora (International Organizations, Non-Government Organizations, etc.)



# Path Forward – Minimization of HFC's

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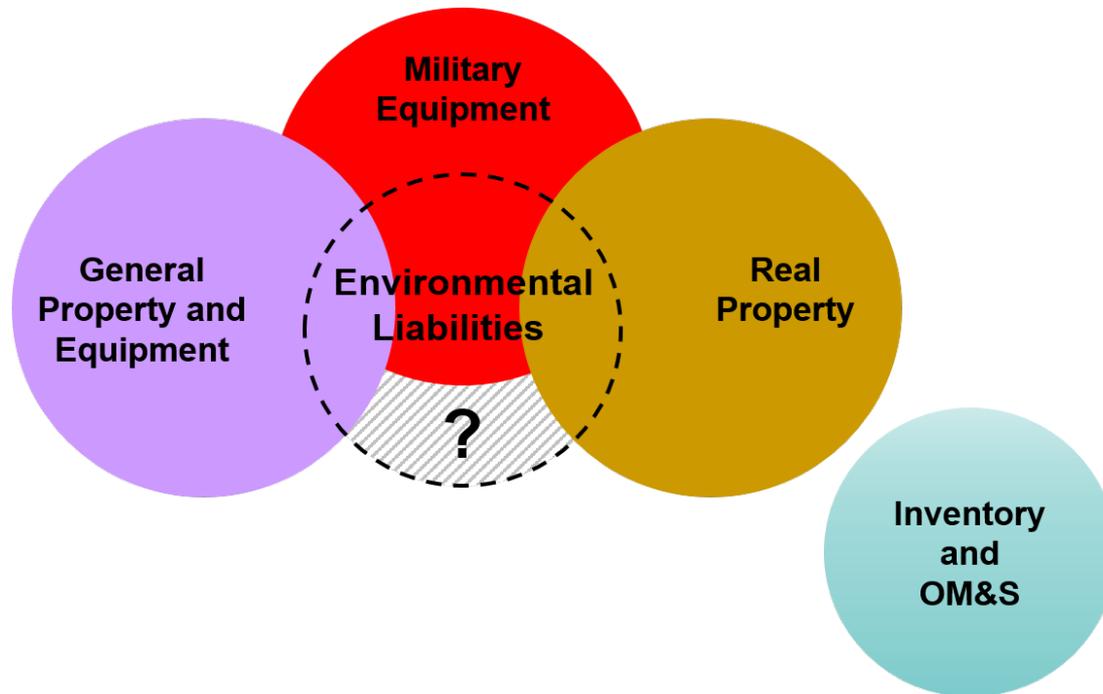
## ➤ Acquisition Community and Program Managers should evaluate risks

- Implement Mandatory HFC Conservation Measures
  - Review & Revise Maintenance Procedures As Necessary
  - Require Recovery, Recycling, and Reclamation
- Use HFCs Only Where Necessary
  - Begin Shifting To Existing Lower-GWP Alternatives
    - Example: Shift From R-404A to R-407A = 46% Reduction in GWP
  - Start Looking At New Low-GWP Alternatives
- Look At The Big Picture
  - Safety
  - Energy Efficiency (Don't trade direct emissions for indirect emissions)
- Talk With Your Suppliers
- Seek Out DoD/Service Expertise



# Environmental Liabilities (EL)

- Federal Law drives Financial Liability Reporting Requirements
- HAZMAT use in systems and operations creates EL
- Challenge: Quantifying EL



More on details on EL in Presentation #18035 today at 4:15PM

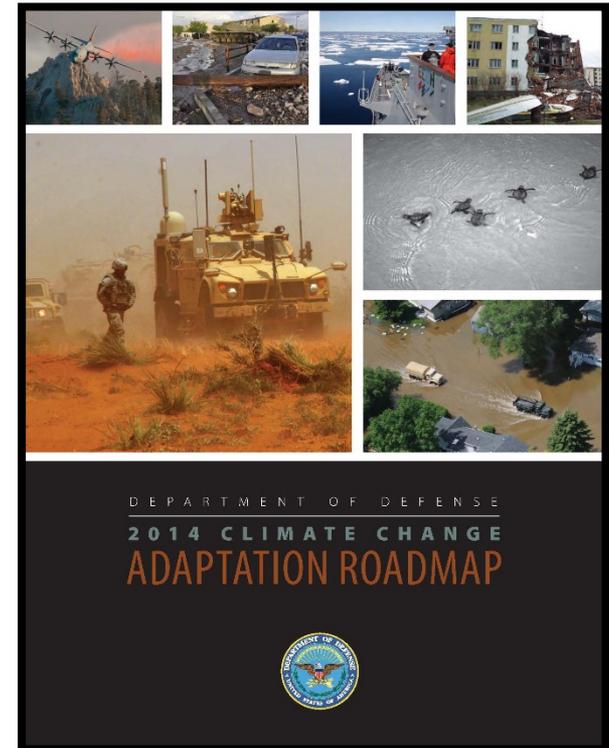


# Climate Change

## Quadrennial Defense Review (QDR) 2014 and Roadmap

The pressures caused by climate change will influence resource competition while placing additional burdens on economies, societies, and governance institutions around the world. These effects are threat multipliers that will aggravate stressors abroad such as poverty, environmental degradation, political instability, and social tensions – conditions that can enable terrorist activity and other forms of violence.

*(QDR 2014, Chapter 1 Future Security Environment, page 8)*



QDR: [http://www.defense.gov/pubs/2014\\_Quadrennial\\_Defense\\_Review.pdf](http://www.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf)  
Roadmap: <http://www.acq.osd.mil/ie/download/CCARprint.pdf>



# Climate Change

## ❖ DoD View of Climate Change

- Increasing DoD's resilience to the impacts of climate change is a key part of fulfilling DoD's vision for sustainability.
- Climate change:
  - "...will affect DoD's ability to defend the Nation and poses *immediate risks* to U.S. national security."
  - "...can significantly add to the challenges of global instability, hunger, poverty, and conflict."

FY14 DoD  
Climate Change  
Adaptation  
Roadmap

DoD Secretary  
Chuck Hagel

## ➤ What We're Doing

- ① Assessing climate-related impacts and planning for them
- ② Integrating climate change into existing policies, plans, processes, programs
- ③ Collaborating: Federal, State, Local, Tribal, International





# REACH

- **REACH is the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) European Union (EU) regulation**
  - Being phased in over time
  - Restricts and bans the import, manufacture, placing on the market, and use of certain chemical substances
  - Places responsibility on industry/users
- **Biggest potential impact may be to Foreign Military Sales (FMS)**
  - US Lost Army “Excalibur” system sale to Germany
- **Acquisition ESOH Community is coordinating with the REACH Working Group to understand DoD’s position and take action, if warranted**
- **Current emphasis is on educating program managers and providing resources should they have questions**

REACH covered in three presentations -- #18064, #18075, & #18005  
today starting at 10:15 AM



# Wrap-up

## Acquisition Environment, Safety, and Occupational Health

### ➤ Mission

- ✓ Support the War Fighter and Address ESOH

### ➤ Policy and Guidance

- ✓ Overview of Major Policy

### ➤ Implementation and Initiatives

- ✓ Program Oversight to Ensure Compliance
- ✓ Sustainability
- ✓ Life Cycle Analysis in Acquisition
- ✓ Hazardous Materials Management
- ✓ HFC Minimization
- ✓ Environmental Liabilities
- ✓ Climate Change
- ✓ REACH





# OASD(EI&E) ESOH Directorate



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# Back up

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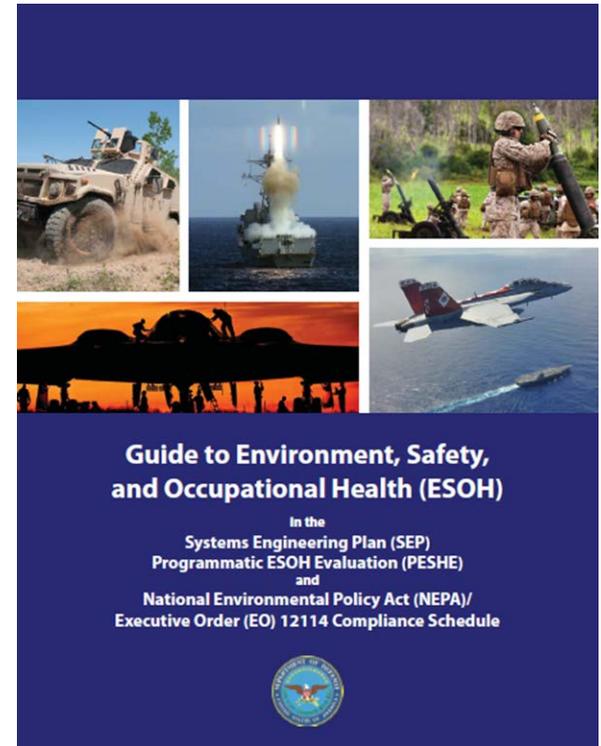




# Additional Resources

## ➤ Guide to ESOH in the Systems Engineering Plan (SEP), Programmatic ESOH Evaluation (PESHE), and NEPA/EO 12114 Compliance Schedule:

- Provides a **holistic approach** to ESOH in Acquisition
- Resource for developing system documentation
- Eliminates redundancy in various acquisition documents
- Built on lessons learned & best practices from Acquisition ESOH professionals
- Delineates expectations for ESOH content in documents, which if followed, should optimize document development and approval
- Describes technical planning for ESOH considerations in SE
- Provides examples of data generated from implementing the technical plan
- Improves guidance on ESOH risk management





# Additional Resources

- **Human Systems Integration (HSI) & ESOH Handbook for pre-Milestone A Joint Capabilities Integration and Development System (JCIDS) and Analysis of Alternatives (AoA) Activities**
  - Designed to help HSI and ESOH Subject Matter Experts (SMEs) **influence systems requirements**
  - Focused on Pre Milestone A –
    - Joint Capability Integration and Development System (JCIDS) and Analysis of Alternatives (AoA) Activities

Introduction
Participation in Pre-MS A Activities
DCR
ICD
AoA Study Guidance
AoA Study Plan
MDD
AoA Execution
Preferred Materiel Solution
Draft CDD
Draft CDD, Capability Statements



# Acquisition Community Connection (ACC) ESOH Community of Practice (CoP)

- Contains link on front page to specific key ESOH areas
- Synchronized to match Systems Engineering CoP
- **ESOH Topics:**

- Air Quality Considerations
- Noise - Far Field
- Noise - Occupational
- ESOH Risk Management
- Hazardous Materials Management
- Electromagnetic Radiation (EMR)
- Sustainable Procurement Program
- Sustainability and Systems Acquisition
- Demilitarization and Disposal Considerations
- Key Mandatory Definitions from MIL-STD-882E
- System Safety Methodology – MIL-STD-882E
- Chemical and Material Risk Management Program
- National Environmental Policy Act and Executive Order 12114

ACC Website:  
<https://acc.dau.mil/esoh>



# Phase I Pilot Projects

- Calculate impacts & life cycle costs of two design alternatives for two acquisition programs:



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573 Sikorsky MH-60R

- Design alternatives: (A) chromated coating system and (B) non-chromated system; manufactured & sustained over 30 years



# Phase II Pilot Projects

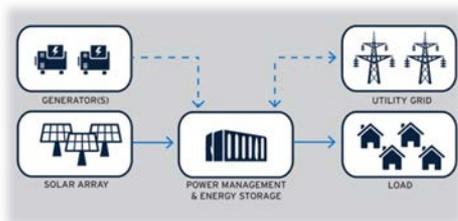
- **3M - Analyzing traditional vs. LED lighting aboard Navy ships**



- **GE Aviation - Analyzing traditional vs. additive manufacturing process for key parts in jet engines**



- **Lockheed Martin - Analyzing alternative mixes of renewable energy & micro-grids at Fort Bliss, TX**





# Sustainability Analysis

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- **Forces thinking about life cycle activities of the system in an organized, consistent method**
  - Human health & environmental impacts
  - Life cycle costs of impacts
- **Innovative**
  - Pushes the envelope and allows an improved view of Total Ownership Cost and Impacts
- **Simple but credible**
  - Tested by industry LCA experts



# Hazardous Materials Management, Cont.

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- **Phase 1: Updated National Aerospace Standard (NAS) 411, Hazardous Materials Management Program (HMMP), and developed complementary NAS 411-1, Hazardous Materials Target List (HMTL)**
  - NAS 411 Provides:
    - Contractors with Task 108 implementation guidance
    - Guidance on establishing a HAZMAT list by category
    - Procedures to obtain Government waiver to use Prohibited HAZMAT in a specific application
  - NAS 411-1
    - Provides a “starting point” for program offices and contractors with baseline lists of Prohibited and Restricted HAZMAT
    - Includes a definition for a “Tracked HAZMAT”
    - Does not include a baseline “Tracked HAZMAT” list (Phase 2 effort)



# Hazardous Materials Management, Cont.

- **Phase 2: Update to National Aerospace Standard 411-1 to add a baseline “Tracked” list for NAS 411-1**
  - DoD Acquisition ESOH IPT Working Group and AIA screened 1007 materials for the proposed Tracked list
  - AIA and DoD Acquisition ESOH IPT WG agreed that only materials with CAS numbers will be included
    - No HAZMAT families included
    - This facilitates identification of materials on a contract or system
  - AIA advocating with International Aerospace Environmental Group (IAEG™) to include all NAS411-1, Hazardous Material Target List, items in the Aerospace and Defense Declarable Substances List (AD-DSL)
    - If material not added to AD-DSL, AIA and DoD will decide whether to include the material on the Target List
    - This will minimize cost to DoD to obtain necessary hazmat info in future contracts
  - AIA exploring how to provide electronic Target List for users



# Hazardous Materials Management, Cont.

- **Phase 3: Update to National Aerospace Standard 411 to add risk assessment guidance for HAZMAT**
  - Considering incorporating a similar model to what has been employed by NAVSEA for HAZMAT avoidance, which will promote a standard approach for risk assessment:
    - Use pre-defined severities for Prohibited and Restricted chemicals
      - » Exposure risks to HM have an intrinsic severity
        - » A carcinogen is always a carcinogen but the probability of exposure will vary based upon application
    - Severity assignment based upon toxicity (carcinogen, reproductive hazard, sensitizer, etc.), physical hazards (flammability, pH) and environmental impact (ODS, PBT, POP, GHG, etc.)
      - » Would be vetted through DoD Acquisition IPT and agreed upon
    - Reduces variation of risk assessments for the same applications



# HFC Minimization, Cont.

## ➤ HFCs Used In Virtually All Existing & New Weapon Systems

- HFC-134a and various blends consisting of HFC-32, -125, -134a, and -143a
  - New Design Shipboard Air-Conditioning & Refrigeration
  - New Design Aviation & Ground/Tactical Environmental Control
- HFC-227ea and HFC-125
  - New Design Ground Combat Vehicle Fire/Explosion Suppression
  - New Design Shipboard and Aviation Fire Suppression
- HFC-236fa and HFC-134a
  - Retrofit for Legacy Shipboard AC&R
- HFC-43-10mee, HFC-245fa, and HFC-365mfc
  - Solvents for Weapons System Production & Maintenance
- HFC-134a and HFC-152a
  - Aerosol Propellants for Weapons System Maintenance
- HFC-245fa
  - Insulating Foam on Shelters
- Others
  - Insulating Foams
  - Structural Foams
  - Ordnance Applications
  - Wind Tunnels

